

Patent claims

1. Method for grinding a rotationally symmetrical machine part (5) provided with a longitudinal bore (20), the one end-face surface of which is embodied as an active surface (24) in the form of a flat truncated cone with a cross-section with a straight contour, characterized in that first said active surface (24) on said machine part (5) held on one side at its exterior circumference is ground, the rotating circumferential surface of the first cylindrical grinding wheel (14) being positioned perpendicularly against said active surface (24), said machine part (5) being displaced in the direction of its rotational and longitudinal axis (17) relative to said first grinding wheel (14), whereby the axial extension (28) of said first grinding wheel (14) covers the radial angled extension of said active surface (24), and in that then in the same clamping the interior wall of said longitudinal bore (20) is ground, a second grinding wheel (16) of smaller diameter being introduced into said longitudinal bore (20) of said machine part (5) by pivoting a grinding headstock (10), which carries at least said first (14) and said second (16) grinding wheel, and placed radially against said interior wall.
2. Method in accordance with claim 1, characterized in that said interior wall of said longitudinal bore (20) is ground using longitudinal grinding.
3. Method in accordance with claim 2, characterized in that said interior wall of said longitudinal bore (20) is ground using peel-grinding.
4. Method in accordance with claim 1, characterized in that said interior wall of said longitudinal bore (20) is ground using infeed grinding.
5. Method in accordance with any of the preceding claims, characterized in that individual axial segments (21, 22, 23) of said interior wall of said longitudinal bore (20) are ground.

6. Method in accordance with any of the preceding claims, characterized in that at least three grinding wheels are brought into their working position by pivoting three grinding spindles that carry said grinding wheels.
7. Apparatus for grinding a rotationally symmetrical machine part (5) provided with a longitudinal bore (20), the one end-face surface of which is embodied as an active surface (24) in the form of a flat truncated cone with a cross-section with a straight contour, in particular for performing the method in accordance with any of claims 1 through 6,
 - with a clamping device for one-sided clamping of said machine part (5) at its exterior circumference and for rotationally driving it,
 - with a grinding spindle slide (9) that can be moved in a direction running transverse to the rotational and longitudinal axis (17) of said machine part (5),
 - with a device for longitudinal displacement of said machine part (5) in the direction of its rotational and longitudinal axis (17),
 - with a grinding headstock (10) that is attached to said grinding spindle slide (9) via a pivot axis (11) running perpendicular to the displacement plane thereof said grinding spindle slide and that carries at least two grinding spindles (12, 13) that can be pivoted into the working position,

- with a first cylindrical grinding wheel (14), arranged on said first grinding spindle (12) and driven thereby, that is for vertical grinding of said active surface (24) situated on said machine part (5) and that has an axial extension (28) that is larger than the radial angled extension of said active surface (24),
 - and with a second cylindrical grinding wheel (16), arranged on said second grinding spindle (13) and driven thereby, that has a smaller diameter than said first grinding wheel (14) and that is for interior cylindrical grinding of the longitudinal bore (20) of said machine part (5),
 - whereby depending on the pivot position of said grinding headstock (10) either the rotating circumferential surface of said first grinding wheel (14) is placed on said active surface (24) of said machine part (5) to be ground or the axis of said second grinding wheel (16) runs spaced from and parallel to said rotational and longitudinal axis (6) of said machine part (5).
8. Apparatus in accordance with claim 7, characterized in that in the arrangement of two grinding spindles (12, 13) on said grinding headstock (10) their axes run parallel to one another and said two grinding wheels (14, 16) are attached on the same side of said grinding headstock (10).
 9. Apparatus in accordance with claim 8, characterized in that three grinding spindles, each with a grinding wheel, are attached to said grinding headstock at angle intervals of 120 degrees each.
 10. Apparatus in accordance with any of claims 7 through 9, characterized in that said clamping device is a chuck (3) with centrally adjustable clamping jaws (4).
 11. Apparatus in accordance with any of claims 7 through 10, characterized in that said clamping device is located on a grinding table (7) that can be moved in said rotational and

longitudinal axis (17) of said machine part (5) relative to said grinding spindle slide (9).